

PATENT**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

IN RE APPLICATION OF: ERIC J. BERGMAN

APPLICATION No.: NOT YET ASSIGNED

FILED: OCTOBER 7, 2003

FOR: **METHODS FOR CLEANING SEMICONDUCTOR
SURFACES**

EXAMINER:

ART UNIT:

CONF. NO:

INFORMATION DISCLOSURE STATEMENT

Mail Stop Patent Application
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. Timing of Submission

This information disclosure statement is being filed concurrently with the filing of the application. The references listed on the enclosed Form PTO-1449 (modified) may be material to the examination of this application; the Examiner is requested to make them of record in the application.

2. Cited Information

Copies of the foreign references and literature can be found in parent U.S. Application Serial No. 09/811,925.

3. Effect of Information Disclosure Statement (37 C.F.R. § 1.97(h))

This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols,

Certificate of Mailing

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as "Express Mail Post Office to Addressee" in an envelope addressed to the Mail Stop Patent Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Express Mail Label No.: EV 254990096US Name of Person Mailing Paper: Debbie GilbertDate of Deposit: October 7, 2003 Signature of Person Mailing Paper: Debbie Gilbert

- results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

4. Fee Payment

No fees are believed due because this Information Disclosure Statement is being filed concurrently with the filing of the application.

Respectfully submitted,

Perkins Coie LLP

Date: Oct. 6, 2003



Kenneth H. Ohriner
Registration No. 31,646

Correspondence Address:

Customer No. 34055
Perkins Coie LLP
Patent – LA
P.O. Box 1208
Seattle, WA 98111-1208
Phone: (310) 788-9900
Fax: (310) 788-3399

EM No. EV 254990096US

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
Form PTO-1449 (Modified)
(Use several sheets if necessary)

COMPLETE IF KNOWN

Application Number	Not yet assigned
Confirmation Number	
Filing Date	October 7, 2003
First Named Inventor	Eric J. BERGMAN
Group Art Unit	
Examiner Name	

Sheet

1

of

5

Attorney Docket No.

54008.8012.US04

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	U.S. Patent or Application		Name of Patentee or Inventor of Cited Document	Date of Publication or Filing Date of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		NUMBER	Kind Code (if known)			
AA	5,055,138			Slinn	10/08/91	
AB	5,120,370			Mori et al.	06/09/92	
AC	5,647,386			Kaiser	07/15/97	
AD	5,503,708			Koizumi et al.	04/02/96	
AE	5,308,745			Schwartzkopf	05/03/94	
AF	4,695,327			Grebinski	09/22/87	
AG	5,632,847			Ohno et al.	05/27/97	
AH	5,911,837			Matthews	06/15/99	
AI	5,705,089			Sugihara et al.	01/06/98	
AJ	5,244,000			Stanford et al.	09/14/93	
AK	5,896,875			Yoneda	04/27/99	
AL	4,974,530			Lyon	12/04/90	
AM	5,120,370			Mori et al.	06/09/92	
AN	5,647,386			Kaiser	07/15/97	
AO	5,248,380			Tanaka	09/28/93	
AP	5,520,744			Fujikawa et al.	05/28/96	
AQ	5,415,191			Mashimo et al.	05/16/95	
AR	5,658,615			Hasebe et al.	08/19/97	
AS	5,858,107			Chao et al.	01/12/99	
AT	5,971,368			Nelson et al.	10/26/99	
AU	5,234,540			Grant et al.	08/10/93	
AV	5,803,982			Kosofsky et al.	09/08/98	
AW	5,944,907			Ohmi	08/31/99	
AX	5,232,511			Bergman	08/03/93	
AY	5,776,296			Matthews	07/07/98	
AZ	6,249,933			Berfield	06/26/01	
BA	6,267,125			Bergman et al.	07/31/01	
BB	6,273,108			Bergman et al.	08/14/01	
BC	6,146,469			Toshima	11/14/00	
BD	4,917,123			McConnell et al.	04/17/90	
BE	4,749,440			Blackwood et al.	06/07/88	
BF	4,817,652			Liu	04/04/89	
BG	5,571,367			Nakajima et al.	11/05/96	
BH	5,063,609			Lorimer	11/05/91	
BI	5,246,526			Yamaguchi et al.	09/21/93	
BJ	5,372,651			Kodama	12/13/94	
BK	3,898,141			Ermanis et al.	08/05/75	
BL	4,050,954			Basi	09/27/77	

EXAMINER

DATE CONSIDERED

*EXAMINER: Initial if reference considered, whether or not criteria is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application(s).

EM No. EV 254990096US

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
Form PTO-1449 (Modified)
(Use several sheets if necessary)

COMPLETE IF KNOWN

Application Number	Not yet assigned
Confirmation Number	
Filing Date	October 7, 2003
First Named Inventor	Eric J. BERGMAN
Group Art Unit	
Examiner Name	

Sheet 2 of 5 Attorney Docket No. 54008.8012.US04

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	U.S. Patent or Application		Name of Patentee or Inventor of Cited Document	Date of Publication or Filing Date of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		NUMBER	Kind Code (if known)			
BM	4,261,791			Shwartzman	04/14/81	
BN	4,264,374			Beyer et al.	04/28/81	
BO	4,615,762			Jastrzebski	10/07/86	
BP	4,899,767			McConnell	02/13/90	
BQ	4,943,540			Ren et al.	07/24/90	
BR	4,971,654			Schnegg et al.	11/20/90	
BS	5,181,985			Lampert et al.	01/26/93	
BT	5,221,423			Sugino et al.	06/22/93	
BU	5,294,570			Fleming Jr. et al.	03/15/94	
BV	5,464,480			Matthews	11/07/95	
BW	5,489,557			Jolley	02/06/96	
BX	5,158,100			Tanaka et al.	10/27/92	
BY	5,235,995			Bergman et al.	08/17/93	
BZ	5,238,500			Bergman	08/24/93	
CA	5,129,955			Tanaka	07/14/92	
CB	5,950,643			Miyazaki et al.	09/14/99	
CC	5,105,556			Kurokawa et al.	04/21/92	
CD	5,326,406			Kaneko et al.	07/05/94	
CE	4,186,032			Ham	01/29/80	
CF	5,832,177			Shinagawa et al.	11/03/98	
CG	5,964,952			Kunze-Concewitz	10/12/99	
CH	5,378,317			Kashiwase et al.	01/03/95	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.	Foreign Patent or Application		Name of Patentee or Applicant of Cited Document	Date of Publication or Filing Date of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T
		Offic e	NUMBER				
CI	JP	4-302144		Hitachi, Ltd.	10/26/1992		
CJ	EP	0 782 177 A2		Texas Instruments Incorporated	07/02/1997		
CK	JP	H03-208900		Susumu Otsuka et al.	09/12/1991		
CL	JP	H04-298038		Hitachi Cable, Ltd.	10/21/1992		
CM	JP	S61-004232		Yukinobu Tanno et al.	01/10/1986		
CN	JP	62-117330		Toshio Wada et al.	05/28/1987		
CO	JP	8-8222		Sony Corporation	01/12/1996		
CP	JP	52-12063		Hiroshi Ikeda	04/04/1977		
CQ	JP	H04-125927		Yutaka Watarai et al.	04/27/1992		

EXAMINER

DATE CONSIDERED

*EXAMINER: Initial if reference considered, whether or not criteria is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application(s).

<p>EM No. EV 254990096US</p> <p>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</p> <p>Form PTO-1449 (Modified) (Use several sheets if necessary)</p>				COMPLETE IF KNOWN	
				Application Number	Not yet assigned
				Confirmation Number	
				Filing Date	October 7, 2003
				First Named Inventor	Eric J. BERGMAN
				Group Art Unit	
				Examiner Name	
Sheet	3	of	5	Attorney Docket No.	54008.8012.US04

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No.	Foreign Patent or Application		Name of Patentee or Applicant of Cited Document	Date of Publication or Filing Date of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Office	NUMBER			
	CR	JP	05-013398	Hitachi Zosen Corp.	01/22/1993	
	CS	JP	H01-262627	Mikio Tsuji	10/19/1989	
	CT	JP	04-370931	Hitachi Zosen Corp.	12/24/1992	
	CU	JP	05-283389	NEC Corp.	10/29/1993	
	CV	JP	03-072626	Dainippon Screen Mfg. Co., Ltd.	03/27/1991	
	CW	JP	06-204130	Mitsubishi Electric Corp.	07/22/1994	
	CX	JP	04-302145	Hitachi Ltd.	10/26/1992	
	CY	JP	07-159980	Nikon Corp.	06/23/1995	
	CZ	JP	05-259139	Hitachi Ltd.	10/08/1993	
	DA	JP	05-109686	Nippon Steel Corp.	04/30/1993	
	DB	JP	63-110732	NEC Corp.	05/16/1988	
	DC	JP	05-902329		04/09/1993	
	DD	JP	02-164035	NEC Corp.	06/25/1990	
	DE	JP	08-160032	Toshiba Corp.	06/21/1996	
	DF	JP	08-08222	Sony Corp.	01/12/1996	
	DG	JP	05-047741	Dainippon Screen Mfg. Co.	02/26/1993	
	DH	JP	04-326516	NEC Corp.	11/16/1992	
	DI	JP	62 118528	Matsushita Electronics Corp.	05/29/1987	
	DJ	JP	05-183151	Matsushita Elec. Ind. Co. Ltd.	07/23/1993	
	DK	EU	0 472 441	Seiko Epson Corp.	08/1991	
	DL	EU	0 548 596	Matsuoka Terumi	11/30/1992	
	DM	EU	0 587 889	Ohmi Tadahiro	05/13/1992	
	DN	JP	04 301245	Canon Inc.	10/23/1992	

OTHER PRIOR ART-NON PATENT LITERATURE DOCUMENTS						
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume issue number(s), publisher, city and/or country where published.				
	DO	Abstract of JP 3041729 published 2/22/91.				
	DP	Heyns, M.M., et al. "New Wet Cleaning Strategies for Obtaining Highly Reliable Thin Oxides," MRP Symposium Proceedings on Materials Research Society, Spring Meeting, San Francisco, CA April 12-13, 1993, p. 35 (1993)				
	DQ	Adler, Marilyn Grace and Hall, George Richard, "The Kinetics and Mechanism of Hydroxide Ion Catalyzed Ozone Decomposition in Aqueous Solution" <i>J.Am.Chem.Soc.</i> , Volume 72, pp. 1884-86, 1950.				
	DR	Nelson, Steve, "Ozonated water for photoresist removal" <i>Solid State Technology</i> , pp. 107-112 (July 1999)				

EXAMINER	DATE CONSIDERED
<p>*EXAMINER: Initial if reference considered, whether or not criteria is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application(s).</p>	

<p>EM No. EV 254990096US</p> <p>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</p> <p>Form PTO-1449 (Modified) (Use several sheets if necessary)</p>				COMPLETE IF KNOWN	
				Application Number	Not yet assigned
				Confirmation Number	
				Filing Date	October 7, 2003
				First Named Inventor	Eric J. BERGMAN
				Group Art Unit	
				Examiner Name	
Sheet	4	of	5	Attorney Docket No.	54008.8012.US04

OTHER PRIOR ART-NON PATENT LITERATURE DOCUMENTS					
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume issue number(s), publisher, city and/or country where published.			T
	DS	Christenson, Kurt K., et al. "Deionized Water Helps Remove Wafer Stripping 'Resist'-ance," www.precisioncleaningweb.com - Precision Cleaning Web - Archives, pp. 10-20 (April 1998)			
	DT	Sehested, K., et al., "Decomposition of Ozone in Aqueous Acid Solutions (pH 0-4)," <i>J. Phys. Chem.</i> , pp. 1005-1009 (1992)			
	DU	Krusell, W.C. et al., "Cleaning Technology for High Volume Production of Silicon Wafers," <i>ECS Proc. of the First Int'l. Symposium on Cleaning Technology I Semiconductor Device Mfg.</i> , pp. 23-32 (October 1989)			
	DV	Vig, John R., "UV/Ozone Cleaning of Surfaces," <i>U.S. Army Elec. Tech. and Devices Lab.</i> , pp. 1-26			
	DW	Vig, John R., "UV/Ozone Cleaning of Surfaces: A Review," <i>Surface Contamination: Genesis, Detection, and Control</i> , pp. 235-253(1979)			
	DX	Tong, Jeremy, et al., "Aqueous Ozone Cleaning of Silicon Wafers," <i>ECS Extended Abstracts, Phoenix, AZ, Abstract No. 506</i> , pp. 753 (October 13-17, 1991)			
	DY	Zafonte, Leo, et al., "UV/Ozone Cleaning For Organics Removal on Silicon Wafers," <i>SPIE Optical Microlithography III: Technology for the Next Decade</i> , Vol. 470, pp. 164-175 (1984)			
	DZ	Baumgärtner, H., et al., "Ozone Cleaning of the Si-SiO ₂ System," <i>Appl. Phys. A</i> , Vol. 43, pp. 223-226 (1987)			
	EA	Isagawa, Tatsuhiko, et al., "Ultra Clean Surface Preparation Using Ozonized Ultrapure Water," <i>Extended Abstracts of the 1982 Int'l. Conf. on Solid State Devices and Materials</i> , pp. 193-195 (1992)			
	EB	Shimada, H., et al., "Residual-Surfactant-Free Photoresist Development Process," <i>J. Electrochem. Soc.</i> , 139(6):1721-1730 (June 1992)			
	EC	Tong, Jeremy K. et al., "Aqueous Ozone Cleaning of Silicon Wafers," <i>Proc. of 2nd Int'l. Symposium on Cleaning Tech. In Semiconductor Device Mfg.</i> , pp. 18-25 (October 1992)			
	ED	Tong, Jeremy K., et al., "Aqueous Ozone Cleaning of Silicon Wafers," <i>Res. Soc. Symp.</i> , pp. 18-25 (1993)			
	EE	Ohmi, T., et al., "Native Oxide Growth and Organic Impurity Removal on Si Surface with Ozone-Injected Ultrapure Water," <i>J. Electrochem. Soc.</i> , 140(3):804-810 (March 1993)			
	EF	Vig, John R., et al., "UV/Ozone Cleaning of Surfaces," <i>IEEE Transactions on Parts, Hybrids, and Packaging</i> , Vol. PHP-12(4):365-370 (December 1976)			
	EG	Vig, John R., "UV/ozone cleaning of surfaces," <i>U.S. Army Electronics Technology and Devices Laboratory, ERADCOM, Ft. Monmouth, NJ, 07703-5302</i> , pp. 1027-1034 (September/October 1984)			
	EH	Tabe, Michiharu, "UV ozone cleaning of silicon substrates in silicon molecular beam epitaxy," <i>Appl. Phys. Lett.</i> , 45(10):1073-1075 (November 1984)			
	EI	Zazzera, L.A., et al., "XPS and SIMS Study of Anhydrous HF and UV/Ozone-Modified Silicon (100) Surfaces," <i>J. Electrochem. Soc.</i> , 136(2):484-491 (February 1989)			
	EJ	Gabriel, Calvin, et al., "Reduced Device Damage Using An Ozone Based Photoresist Removal Process," <i>SPIE Advances in Resist Technology and Processing VI</i> , Vol. 1086, pp. 598-604 (1989)			

EXAMINER	DATE CONSIDERED
<p>*EXAMINER: Initial if reference considered, whether or not criteria is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application(s).</p>	

<p>EM No. EV 254990096US</p> <p>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</p> <p>Form PTO-1449 (Modified) (Use several sheets if necessary)</p>				COMPLETE IF KNOWN	
				Application Number	Not yet assigned
				Confirmation Number	
				Filing Date	October 7, 2003
				First Named Inventor	Eric J. BERGMAN
				Group Art Unit	
				Examiner Name	
Sheet	5	of	5	Attorney Docket No.	54008.8012.US04

OTHER PRIOR ART-NON PATENT LITERATURE DOCUMENTS					
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume issue number(s), publisher, city and/or country where published.			T
	EK	Suemitsu, Maki, et al., "Low Temperature Silicon Surface Cleaning by HF Etching/Ultraviolet Ozone Cleaning (HF/UVOC) Method (I) -Optimization of the HF Treatment-," <i>Japanese Journal of Applied Physics</i> , 28(12):2421-2424 (December 1989)			
	EL	Kern, Werner, "The Evolution of Silicon Wafer Cleaning Technology," <i>J. Electrochem. Soc.</i> , 137(6):1887-1892 (June 1990)			
	EM	Kasi, S.R., et al., "Surface Hydrocarbon Removal from Si by UV/Ozone," <i>ECS Extended Abstracts</i> , No. 458, pp. 691-692 (1991)			
	EN	Kasi, Srinandan R., et al., "Vapor phase hydrocarbon removal for Si processing," <i>Appl. Phys. Lett.</i> , 57(20):2095-2097 (November 1990)			
	EO	Huynh, Cuc K., et al., "Plasma versus ozone photoresist ashing: Temperature effects on process-induced mobile contamination," <i>J. Vac. Sci. Technol.</i> , B9(2):353-356 (Mar/Apr 1991)			
	EP	Bedge, Satish, et al., "Kinetics of UV/O ₂ Cleaning and Surface Passivation Experiments and Modeling," <i>Mat. Res. Soc. Symp. Proc.</i> , Vol. 259, pp. 207-212 (1992)			
	EQ	Goulding, M.R., "The selective epitaxial growth of silicon," <i>Materials Science and Engineering</i> , Vol. B17, pp. 47-67 (1993)			
	ER	Ganesan, Gans S., et al., "Characterizing Organic Contamination in IC Package Assembly," <i>The Int'l. Soc. for Hybrid Microelectronics</i> , Vol. 17, #2, Second Quarter, pp. 152-160 (1994)			
	ES	Egitto, F.D., et al., "Removal of Poly(Dimethylsiloxane) Contamination From Silicon Surfaces With UV/Ozone Treatment," <i>Mat. Res. Soc. Symp. Proc.</i> , Vol. 385, pp. 245-250 (1995)			
	ET	Amick, J.A., "Cleanliness and the Cleaning of Silicon Wafers," <i>Solid State Technology</i> , pp. 47-52 (November 1976)			
	EU	Bolon, D.A., et al., "Ultraviolet Depolymerization of Photoresist Polymers," <i>Polymer Engineering and Science</i> , 12(2):108-111 (March 1972)			
	EV	Krusell, W.C., et al., "The Characterization of Silicon Substrate Cleaning Treatments by use of SIMS and MOS Electrical Testing," <i>ECS Extended Abstracts</i> , No. 229, p. 331-332 (1986)			
	EW	Anantharaman, Ven, Ph.D., et al., "ORGANICS: Detection and Characterization of Organics in Semiconductor DI Water Processes," <i>Ultrapure Water</i> , pp. 30-36 (April 1994)			
	EX	"Ozone Concentration Measurement In A Process Gas," <i>Proposed IOA Pan American Group Guideline</i> , pp. 1-21 (December 1993)			
	EY	"Ozone for Semiconductor Applications," Sorbios, pp. 1-6 (October 1991)			

EXAMINER	DATE CONSIDERED
<p>*EXAMINER: Initial if reference considered, whether or not criteria is in conformance with MPEP 609. Draw line through citation if not in conformance <u>and</u> not considered. Include copy of this form with next communication to application(s).</p>	